



Rewarding Learning

ADVANCED

General Certificate of Education

2017

Centre Number

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Candidate Number

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Software Systems Development

Unit A2 1:

Systems Approaches and Database Concepts



A2S11

[A2S11]

WEDNESDAY 24 MAY, AFTERNOON

TIME

2 hours.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

This paper is accompanied by a Pre-release Case Study. You must **not** use your own annotated copy of this Case Study.

Write your answers in the spaces provided in this question paper.

Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in **questions 2, 4 and 7**.

For Examiner's use only			
Question	Marks available	Marks	Remark
1	8		
2	6		
3	9		
4	8		
5	7		
6	7		
7	13		
8	13		
9	20		
10	9		
Total	100		

3 David is considering the use of the SCRUM methodology and investigates the various roles involved.

(a) Insert a tick (✓) in the table below to show which responsibility should be allocated to which SCRUM role.

Responsibility	SCRUM Role		
	Product Owner	Scrum Master	Development Team
Prioritises Product Backlog items			
Removes impediments to progress			
Defines acceptance criteria for each Product Backlog item			
Ensures the time of each timebox is not exceeded			
Determines which high priority subset of the Product Backlog should be built into a sprint			

[5]

Examiner Only

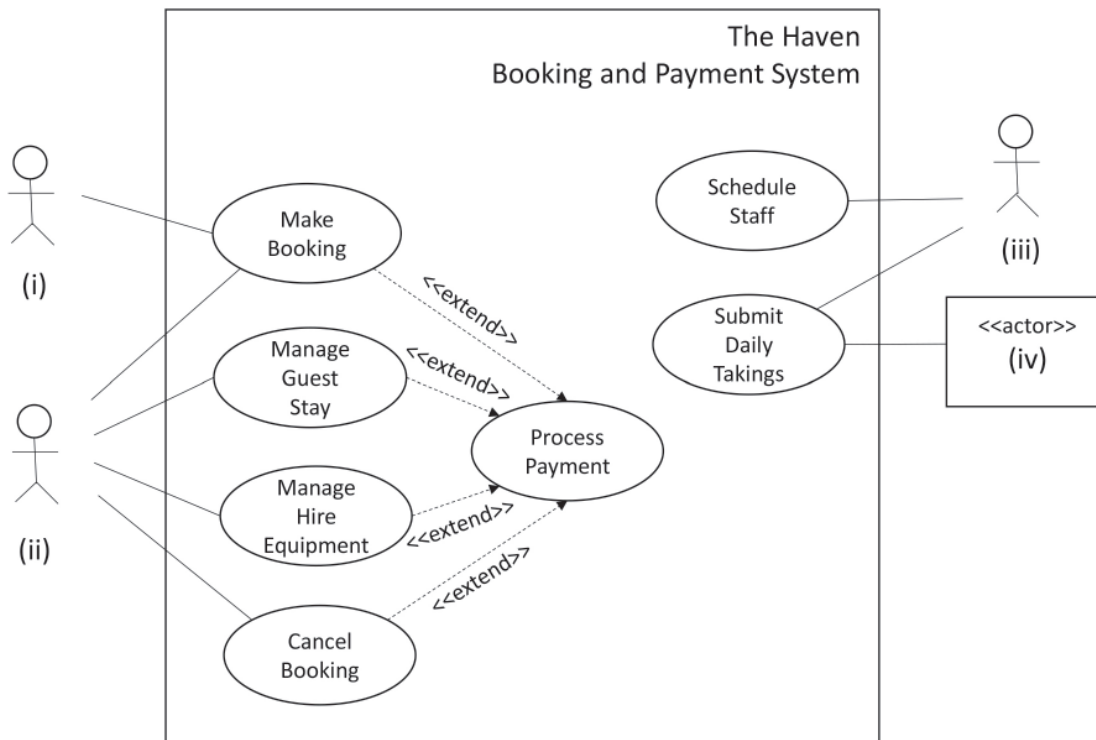
Marks Remark

(b) Using a suitable diagram, illustrate how the SCRUM methodology works.

Examiner Only	
Marks	Remark

[4]

5 Arthur, the analyst, uses the Unified Modelling Language, UML, to visualise and document the online system he is developing for The Haven.



(a) Suggest missing labels for all actors in the use case diagram.

- (i) _____
- (ii) _____
- (iii) _____
- (iv) _____ [4]

(b) Explain the use of the «extend» relationship in The Haven use case diagram.

_____ [3]

Examiner Only	
Marks	Remark

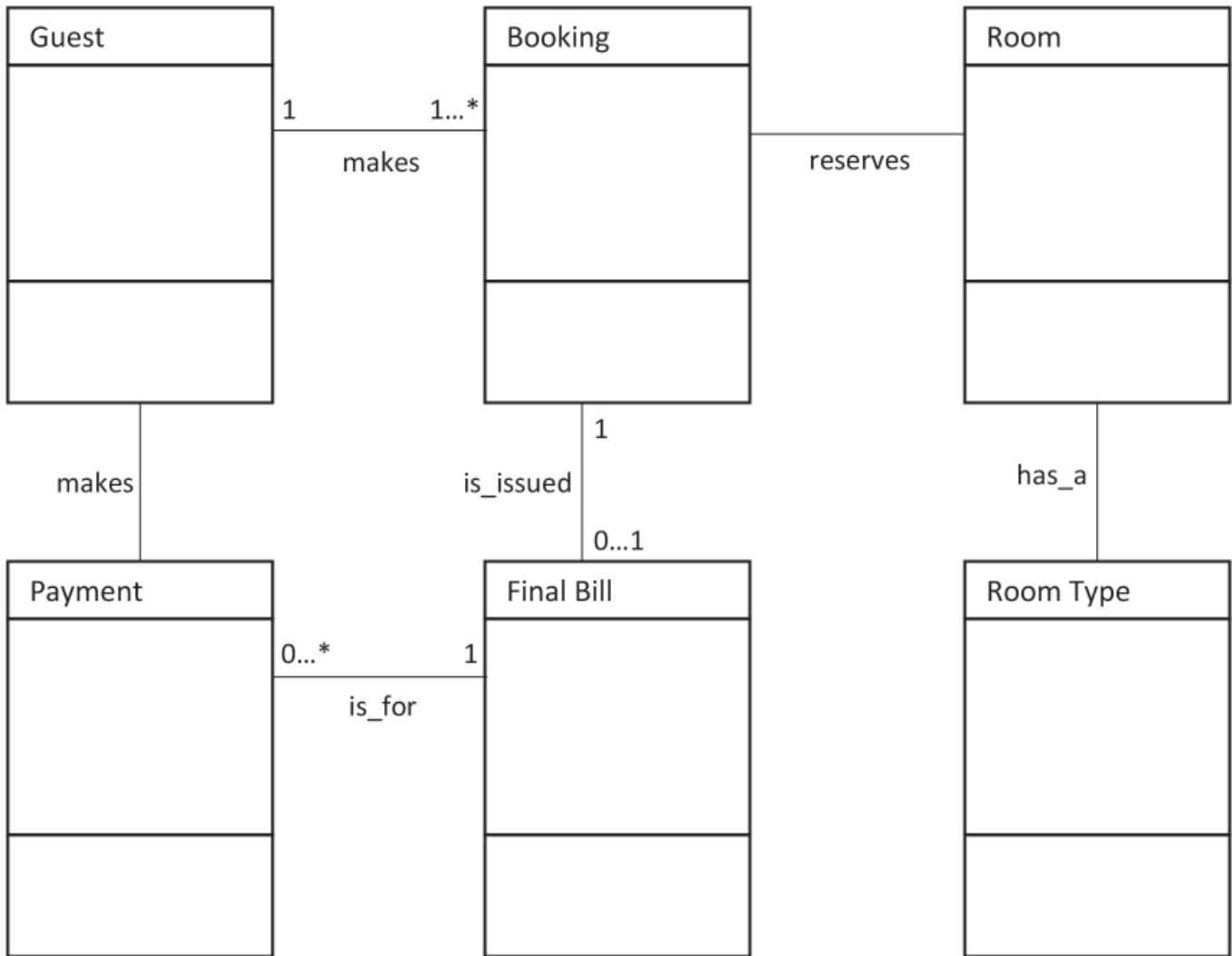
- 6 Arthur decides to analyse an example of a final bill issued to a guest on check out.

THE HAVEN FINAL BILL

Booking No:	B234	Issue Date:	2nd May 2017
Booking Date:	20 th October 2016	Guest No:	23
Check In Date:	30 th April 2017	Guest Name:	Jim Halliday
No of Nights:	2 [Nightly Rate Applies]		
No of Adults:	3		
No of Children:	0		
Special Offer:	No		

Room No	Type of Room	Room Service (£)	Additional Charge (£)	Accommodation Charge (£)	Accommodation Charge After Discount (£)	Total (£)
23	Single	50.00	0.00	220.00	198.00	248.00
24	Double	70.00	40.00	400.00	360.00	470.00
					Grand Total (£)	718.00
					Minus Payments Made (£)	200.00
					Amount Due (£)	518.00

(a) He begins the data modelling process by drawing a class diagram.



Using information from the final bill as a guide, add the following to the Class diagram above:

- multiplicity to **three** associations, where missing;
- an attribute called **NightlyRate**, used to calculate the accommodation charge for each room;
- an attribute called **RoomServiceCharge**, used to store the room service charge;
- an operation called **ProduceBill()**, used to create a bill. [6]

(b) Describe **one** difference between a class diagram created in the analysis phase of development and a class diagram created in the design phase.

[1]

Examiner Only	
Marks	Remark

- (b) Using the headings below, create a test plan to ensure that correct discounts are applied to guest bookings at The Haven.

Assume BookingDate is 24/05/17.

Test Data	Reason for Test Data	Expected Result
1. CheckInDate 22/08/17 New Guest	CheckIn date is less than three months and it is a new guest	0%

[5]

Examiner Only	
Marks	Remark

8 Arthur begins normalisation. He examines a page from the Hire Diary, as shown below. All hire items are individually coded.

DATE: 7th May 2017

STAFF	ROOM NO.	HIRE NO.	NO. OF ITEMS	ITEM NO.	ITEM DESCRIPTION	RETURNED?
<i>Fred Smith (S02)</i>	5	1	5	1234	<i>Tennis Ball pack</i>	✓
				1255	<i>Racquet</i>	✓
				1256	<i>Racquet</i>	✓
				1300	<i>Fishing Rod</i>	✓
				1309	<i>Waders</i>	✓
					<i>Cost: £15 Paid</i>	

(a) List a field which can be derived and does not need to be included in the normalisation process.

_____ [1]

(b) Using a suitable example, explain why the Hire Diary is not in 1NF form.

_____ [2]

Examiner Only	
Marks	Remark

(c) Transform the data into **third** normal form showing:

- **First** Normal Form

- **Second** Normal Form

- **Third** Normal Form

[10]

Examiner Only	
Marks	Remark

- 9 The software development team has implemented five tables in the database according to the design specification below.

GUEST	
Field	Data Type
<u>GuestNo</u>	VARCHAR(4)
Surname	VARCHAR(30)
FirstName	VARCHAR(30)

BOOKING	
Field	Data Type
<u>BookingNo</u>	VARCHAR(6)
BookingDate	DATE
CheckInDate	DATE
NoOfNights	INT
BookingStatus	VARCHAR(10)
NoOfAdults	INT
NoOfChildren	INT
GuestNo*	VARCHAR(4)

BOOKINGDETAILS	
Field	Data Type
<u>BookingNo*</u>	VARCHAR(6)
<u>RoomNo*</u>	INT

ROOM	
Field	Data Type
<u>RoomNo</u>	INT
TypeNo*	INT

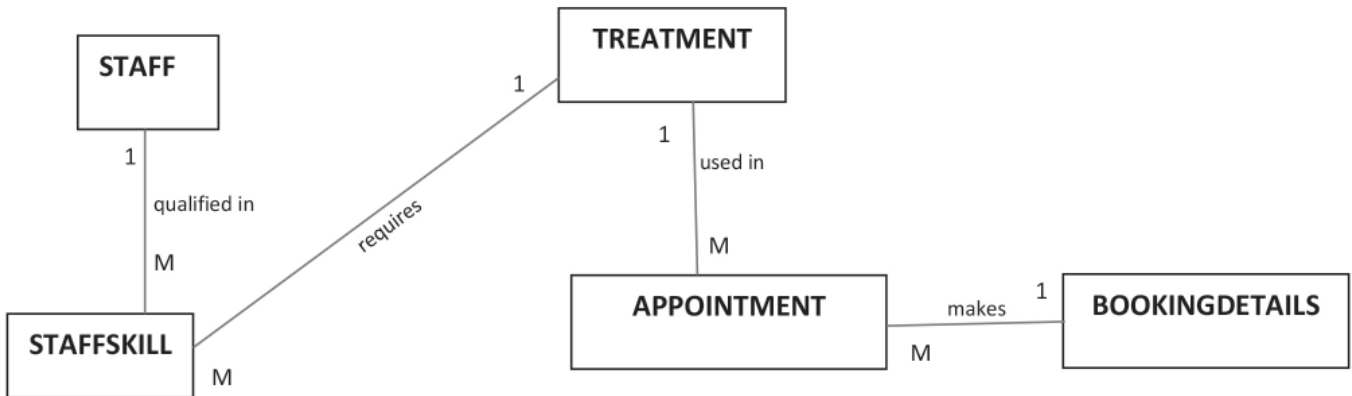
ROOMTYPE	
Field	Data Type
<u>TypeNo</u>	INT
RoomDescription	VARCHAR(8)
MaxNoRoom	INT

- List the different room types and the number of rooms of each type in the hotel.

[3]

Examiner Only	
Marks	Remark

10 Arthur reviews an entity relationship (ER) model for appointments at the hotel spa.



(a) Arthur starts to derive the relational tables from the ER model. Complete the table below.

Table	Primary Key	Foreign Key
TREATMENT		None
STAFF	<u>StaffNo</u>	None
STAFFSKILL	<u>StaffNo</u> <u>TreatmentNo</u>	
APPOINTMENT		

[5]

Examiner Only	
Marks	Remark

(b) Suggest **two** examples of how different types of constraints, placed on specific fields, could be used to enhance data integrity.

Example 1

Example 2

[4]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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Case Study

[A2S11]

WEDNESDAY 24 MAY, AFTERNOON

Exam Copy

THE HAVEN

The Haven is a private hotel set in stunning grounds overlooking the sea. Originally the home of a Judge, this magnificent property was really a stately home that even boasted a library. The property fell into disrepair over the years and was finally sold at a fraction of its value to the current owners, Hugh and Jean Davis.

Following a major renovation programme, The Haven was opened in 2012 as a private hotel, offering twelve double rooms, five single rooms and three family rooms. The hotel aims to provide a quiet, luxury retreat for those wanting to get away from it all. Guests enjoy excellent accommodation, fine dining, a nine hole golf course, tennis courts, fishing and pony trekking on the estate. The hotel has also opened a spa which has been a major success and is nearly always fully booked. Regular guests now book treatments well in advance of their arrival. The Haven has become quite an exclusive location and gets excellent reviews. Many guests return on a regular basis.

The hotel is managed by Hugh and Jean and staffed entirely by local people. There is a Manager, Heather McGill and a Deputy Manager, Brian Todd. They are responsible for the day to day management of the hotel, ensuring that staff conduct all their required duties effectively. One or other of these will act as the Duty Manager. They work eight hour shifts from 7 am to 3 pm or from 3 pm to 11 pm. After this time Hugh takes over responsibility for any issues that arise. A Night Porter, Sam Donald, has recently been employed but at present there is no coverage at weekends.

There are six cleaning staff who operate on a rota basis so that there are four on duty at any one time until 6 pm and then just one for the evening until 10 pm. The Head Cleaner, Mary James, allocates daily duties and reports to the Duty Manager.

The Head Chef, James Davison, is responsible for the kitchen staff. At breakfast time the kitchen is staffed by one of the two Deputy Chefs, Alice Kane or Hugh McBride, as well as two kitchen workers and three waitresses. At lunch time one chef is in attendance along with two kitchen staff and three waiting staff. At dinner time James and one of the Deputy Chefs manage the kitchen along with three kitchen staff and four waitresses. If James is off duty, then the two Deputy Chefs must be in attendance. Lunch in the restaurant is only available to guests at the hotel although bar food is available to the public from 12–3 pm and from 5–7 pm. This requires careful planning as staff cover is limited and food still has to be prepared in the kitchen and collected and served by the bar staff at these times. Room service is also available for guests and must be recorded along with booking details and added to the final guest bill.

Creating a manageable rota for the kitchen is time consuming and when a member of staff is off sick it is very difficult to maintain an adequate service. Previously the restaurant in the hotel only catered for guests. Once the hotel was well established Hugh and Jean decided to open it to the public for evening meals. This development has significantly increased the staff workload and caused major booking issues.

Guests at the hotel are charged per room for each night. However, weekly rates are available and special discounts for families are included in the pricing structure. Guests who book up to six months in advance are given a 10% discount, while those who book three months in advance are given a 5% discount. Notice of cancellations must be given at least 24 hours in advance otherwise there is a £40 penalty fee.

Room Rates

Room Type	Nightly rate per room	Weekly rate per room	Discounted (10%) rate per room – 6 months	Discounted (5%) rate per room – 3 months
Double	£200	£1200	£180	£190
Single	£110	£660	£99	£104.50
Family 2 adults 2 children	£230	£1380	£207	£218.50
Packages	Pricing available on request depending on advertised offers			
Long Stay	Pricing available on request depending on length of stay			

All prices include breakfast.

The Haven offers a range of gift vouchers for services at the hotel.

Guests who return to the hotel within a twelve month period are also given a 3% discount. This discount can be applied along with the discounts applied to other early booking discounts. Keeping track of guests who have returned within the last twelve month period is very difficult given the current systems.

The Haven also caters for guests who wish to stay for longer periods, particularly over the winter months. This type of booking allows long term guests the benefit of hotel accommodation for an extended period of time from November until March and particularly suits retired couples.

Guests staying at the hotel have full access to all facilities. However, the spa, tennis courts and pony trekking must be booked at least a day in advance. Guests may also hire tennis racquets, balls and fishing gear.

All records at the hotel are currently held in diaries. Maintenance of these diaries is a real problem for the reception staff who are always busy dealing with check-in and check-out, telephone enquiries and guest issues.

There is a **Reception Booking Diary** which must be completed by the reception staff. This is often quite untidy with staff scribbling additional notes such as 'travel cot required', or 'twin beds required', or if a guest makes a cancellation the booking is scored out. In the event of a cancellation if a fee is involved it must be noted in the diary and payment taken. At the reception desk, there is also an A3 stationery pad containing a grid showing all bedrooms in the hotel. This grid must be updated daily and should reflect the occupancy of the hotel on a daily basis. A new grid is used each week. The reception staff use the grid to assist bookings. However this manual system is clumsy and messy. It is difficult to see room availability and errors are sometimes made. In this event guests may be advised at short notice that a mistake has been made in the booking and that alternative dates must be chosen. This is clearly very unsatisfactory.

Hugh transcribes the detail of the Reception Booking Diary to a spreadsheet on his computer. He attempts to do this daily but it is more often a weekly exercise. He realises that he has no proper tracking or reporting system and that there is a real need to consider booking trends throughout the year.

There are four facilities booking diaries at Reception. These are the **Spa Booking Diary**, the **Courts Booking Diary**, the **Trekking Booking Diary** and the **Hire Diary**. The bookings for the Spa Booking Diary are the most problematic. There must always be two staff available for spa treatments but not all staff can conduct all treatments. When bookings are made, it is important for the staff at Reception to ensure that a spa treatment can be provided by the correct member of staff. Problems have arisen as a result of reception staff making incorrect appointments. At 4 pm each evening the spa bookings are photocopied and sent to the spa so that all bookings for the next day are arranged with the spa staff. Payment can be made in advance, on the day of the treatment at Reception or else added to the final bill for the guest. All payments must be recorded in the diary and totals must be checked by 4 pm when all payments and details of final bill additions are passed to the Duty Manager. Occasionally guests check out before the spa charge has been added to their bill. The Duty Manager checks all transactions and summarises the information for Hugh who accumulates accounting information in his spreadsheet.

The **Courts Booking Diary** is quite straightforward. There is no fee associated with booking a court and it is just a question of booking the three tennis courts for an hour at a time.

The **Trekking Booking Diary** requires careful completion as there must be one member of staff from the stables available for every three ponies. There are four staff members available from 10 am until 3 pm Monday to Saturday. Pony Trekking is not available on Sundays at present. There is a rate of £10 per hour, per child of age twelve and under and £12 for children aged thirteen to sixteen and £15 thereafter. Booking slots are made between 10 am and 3 pm.

The **Hire Diary** is maintained on a daily basis and the reception staff must ensure that all equipment is returned in a satisfactory condition. Details of the equipment borrowed along with the guest details and room number should be recorded. Payment is noted (£3 per item) in the Hire Diary and all cash must be totalled and reconciled at the end of the day. Guests can also have the cost of hire added to their final bill. This is not always checked when final bills are being settled and money is lost. Reception staff must check that items borrowed are returned and checked off. This does not always happen and many items are unaccounted for and are sometimes found in guest bedrooms. All details must be passed to the Duty Manager by 6 pm each evening. The Duty Manager checks all transactions and summarises the information for Hugh to enter on his spreadsheet.

The **Restaurant Booking Diary** is also maintained by reception staff. Guests wishing to dine at the hotel must book their evening meal the day before. Dinner bookings are passed to the Duty Manager who relays them to the Chef in the kitchen. However, now that the restaurant is open to the public at night, problems have arisen regarding table allocation. If bookings are not correctly recorded for guests and reception staff take public bookings for dinner, then serious issues emerge. There have been instances of double booking with priority being given to the public. Guests have complained about this on more than one occasion.

The Tea Garden was opened in May 2014. Hugh and Jean extended and developed an existing conservatory at the back of the house to facilitate this development. The idea was to provide a special, bookable, afternoon tea service to the public along with free access to the beautiful gardens on the estate. This idea was a terrific success with the tea garden packed to capacity in the summer months. The fact that car parking facilities were available along with the opportunity to walk around the gardens free of charge turned out to be a much bigger success than was anticipated. Hugh and Jean believed that afternoon tea provision could be managed by the existing dining room staff. They considered that staff serving lunches could extend their hours and cover the period from 2–5 pm when afternoon teas were available. However, they totally underestimated the work load, the additional demand on the kitchen, the need for adequate stock control and the fact that members of staff are now really stretched. While they have managed to provide the service so far, some customers have indicated that they did not have

the service they deserved for the price. Payment for afternoon tea is taken at the reception desk. Payments must be recorded fully in the **Tea Garden Diary** and any vouchers stapled to the page. Vouchers for the Tea Garden can also be bought at reception. The takings for the day and the diary must be presented to the Duty Manager after 5 pm for checking. All transactions are summarised for Hugh to enter in the spreadsheet.

The Craft Shop opened in May 2016 and is a new development that is an inevitable hit with tourists. The Craft Shop occupies a refurbished outbuilding of the original estate. It is stocked with local items that feature wood carvings, crochet products and knitted garments. It also sells hand-made stationery products and some exclusive paintings by two local artists. Some customers have sought to commission particular items ranging from garments to specific landscapes. The Craft Shop is managed by Mary Magill. She is required to pass all stock requests through Jean for approval before she can make an order or pass on commission requests to her suppliers. She regards this as totally unnecessary. Approval is often delayed as it is not an immediate priority and customers sometimes cancel orders. While Mary is aware she is an employee of the hotel she would like to have more control over the management of the shop. All financial transactions must be fully recorded each day and passed to the Duty Manager for checking. Summary data is presented to Hugh.

The Haven has achieved its primary aim in providing an exclusive retreat for guests. However the senior staff at the hotel are extremely concerned at the onerous administrative practices currently in place. As far as they are concerned nothing is 'joined up'. There is no overview of all the different systems in place and no proper communication system between the different areas. As yet there is no suitable website available. They have asked to meet Hugh to discuss the issues.

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